was rejected by the Senate, amid scenes of enthusiasm and disorder, by a majority of 1707 to 661.

In May, 1919, the council reported the receipt of two memorials relating to the same subject, and proposed the appointment of a syndicate to consider it. The first memorial stated:—"We believe that the time has passed for the adoption of half-measures, and that women should be admitted to full membership of the University." In the second, objection was taken to the "attempt to force a hasty conclusion on a prejudged issue," and the suggestion made that a solution might be found by allowing women to obtain degrees without becoming full members of the University. This suggestion—which is made now by those who in 1897 opposed the granting of degrees to women at all—is practically the same as that which was rejected by a large majority then, and illustrates how far the attitude towards women has changed in twenty-two years. There are few now who would dare openly to advocate the exclusion of women from the recognition rightly due to their study and their services to learning.

On Thursday, October 30, a discussion on the subject was held in the Senate House. It is clear that a large progressive body of opinion is in favour of removing all restrictions on the studies of women and on their just recognition by the University. It is also clear, however, that there is still an underlying opposition to the idea of a mixed university, which will manifest itself in proposals designed to shelve the question temporarily by the adoption of half-measures. There can be little doubt that in the end all restrictions will be removed; and there are many who believe that it will be wiser and more generous for the University now to allow women the full membership they demand than to have the change forced upon it by outside influence, *e.g.* through the coming Royal Commission.

NOTES.

ANNOUNCEMENT of the approaching fiftieth anniversary of the foundation of NATURE was made in a letter sent a few weeks ago to the presidents of a number of scientific societies, official heads of British universities, and other representatives of progressive knowledge, most of whom are among the contributors to the columns of this journal. The result of this communication has been that we have received numerous cordial messages of congratulation, many of them containing interesting reminiscences associated with NATURE, and all most appreciative of the services it affords to scientific workers. It was hoped that space could have been found to publish these messages this week, but this has proved impracticable. We believe, however, that these testimonies to the close attention paid to the contents of NATURE will interest a wide scientific public, and therefore propose to place a selection from them before our readers in next week's issue.

THE general arrangement of Notes in these columns follows the principle of from man to machine; early paragraphs are concerned with current topics and events, and these are followed successively by Notes on subjects relating to biological, physical, and engineering sciences. The articles on scientific progress which we have been fortunate enough to secure for this issue are arranged in much the same order, so that each has a relationship to the contributions which precede and follow it. In addition to the descriptive articles concerned with different fields of scientific activity, short accounts are given of a few important British institutions established for research purposes since NATURE was first published. These articles will, we think, serve to increase the value of this jubilee number as an epitome of outstanding developments of scientific work during the past fifty years.

ON Wednesday, October 29, Mr. Balfour was inaugurated Chancellor of Cambridge University. In a letter to the Vice-Chancellor dated October 25 he had written:—"In so far as lifelong devotion to the University, unceasing interest in its welfare, and pride in its great services to learning be sufficient qualifications for that high post, I am not unfitted to fill it." His election was unopposed. In presenting the Letters Patent the Vice-Chancellor dwelt upon the needs of the University and upon the possibility of utilising the learning available in the University more fully in the service of the Empire. The new Chancellor agreed that it is the business of the community to make easier the path of those who have shown what the sound learning and scientific training of a university can do for a national cause, but at the same time he felt that, in the main, Cambridge would have to trust, and could well trust, its own powers in the coming arduous days of peace. In all departments of national activity, but especially in the scientific study of the mechanical, economic, chemical, medical, or physical problems of the last five years, our universities—and not least Cambridge—have earned a position in the national estimation which they have never held before. This position carries great opportunities and great obligations with it. The interest of the next few years and their influence on the future history of education and human knowledge are immense. There will undoubtedly be a strong tendency towards the adoption of a more technical education and towards the teaching of "practical" subjects in a university course; this tendency cannot, and must not, be opposed, but at the same time it is most earnestly to be desired that our universities should keep before the eyes of their students the three chief motives for the acquisition and improvement of knowledge: a pleasure in knowledge for its own sake, a sure faith that no attempt to acquire and improve knowledge is vain, and a reasoned belief in the power of knowledge to help and elevate mankind. Cambridge has chosen wisely in electing a Chancellor in whom these motives are so strong, and who possesses in a high degree the power and opportunity of keeping them before the eyes of the best of his countrymen.

MEMORIAL tablets to Lord Lister to be erected at University College, London, will be unveiled on Tuesday, November 11, by Sir George Makins, president of the Royal College of Surgeons, and Sir J. J. Thomson, president of the Royal Society. The Duke of Bedford, president of the Lister Memorial Committee, will preside.

THE VERY REV. W. R. INGE, Dean of St. Paul's, has been appointed Romanes lecturer for 1920 at the University of Oxford. The date and subject of his lecture will be announced later. The late Camden professor of ancient history, Mr. F. J. Haverfield, has bequeathed the residue of his estate, subject to certain charges, in trust to the University for the advancement of the study of Romano-British antiquities.

MR. W. R. COOPER has just retired from the editorial chair of the *Electrician*, having decided to devote the whole of his time to his consulting practice. He was appointed editor of our contemporary in 1906, and under his editorship the journal has represented electrical science at its best, as well as progressive practice. He will be succeeded by Mr. F. H. Masters, who was chief assistant editor at the outbreak of war in 1914.

At the annual general meeting of the Cambridge Philosophical Society, held on October 27, the following were elected officers of the society for the ensuing session, 1919–20:—*President:* Mr. C. T. R. Wilson. *Vice-Presidents:* Sir W. J. Pope and Sir E. Rutherford. *Treasurer:* Prof. Hobson. *Secretaries:* Mr. A. Wood, Mr. G. H. Hardy, and Mr. H. H. Brindley. *New Members of the Council:* Prof. Inglis, Prof. Seward, Dr. Rivers, Dr. E. H. Griffiths, and Mr. F. A. Potts.

Dr. O. L. Brady, president of the National Union of Scientific Workers, took the chair at a meeting held on October 30 to inaugurate a London branch. He pointed out that the organisation of the union is by branches. Although there are already branches in South Kensington, the Board of Agriculture, the London County Council, and at Woolwich, it was felt that a more central branch should be formed to meet the needs of workers engaged in the City and in the central district of London. A resolution that a London branch of the National Union of Scientific Workers be forthwith formed was passed unanimously, and Dr. H. M. Atkinson and Mr. W. E. King were elected chairman and secretary respectively of the branch.

The *Times* of November 4 publishes the following message from its New York correspondent, dated November 3:—"The gift of a further 2,000,000*l.* to the Rockefeller Institute by the founder, Mr. John D. Rockefeller, is announced to-day. The institute, which was founded in 1901, has become the largest endowed establishment in the world for medical research. It had already received from Mr. Rockefeller successive gifts to the amount of 5,500,000*l.* and real estate valued at 500,000*l.* The scientific staff numbers sixty-five, and in addition there are 310 persons employed in technical and general services. The latest gift will enable research to be conducted in new fields in biology, chemistry, and physics, as well as in medicine itself, and the study of practical problems relating to disease in men and animals."

At the Philosophical Congress, held at Bedford College last July, particular interest centred round the physiological researches of Dr. Head and his fellow-workers into the nature of the function of the cortex cerebri. This work has been going on for the last eighteen years. It started with the now classical experiment performed by Dr. Head, with the aid of Dr. Rivers, on the innervation of his own forearm. Following the clue which that experiment afforded, the function of the cerebral cortex in regard to sensation has been more and more clearly elaborated. Injuries due to the war have afforded means of immediately testing theories such as we might have had to wait long for under other conditions. Some of our readers are anxious to know where they can obtain an account of this work. Unfortunately, it is not at present available in the form of a treatise or monograph; it exists only in articles in medical journals. A very clear epitome of the whole theory, however, with illustrative cases, and free from technical terms, is the article by Dr. Head himself on "Sensation and the Cerebral Cortex," which fills the whole number of *Brain*, vol. xli., part ii., issued in 1918. The philosophical interest in the theory was due to the complete scientific refutation it offers of all psychological theories which build up knowledge out of original sense-material. Sensations depend neither for their existence nor for their psychical quality on the cortex cerebri, which has a purely interpretative function in regard to them.

Last July Sir Robert Hadfield invited a large party of his Sheffield workmen to London to visit the British Scientific Products Exhibition, and also the Science Museum at South Kensington. Included in the party were a number of apprentices, some from the Hadfield works in Sheffield and others from similar establishments in London. Prizes were offered to the boys for the best essays descriptive of the visit. The winning essays, which are now printed for private circulation, are a striking commentary on the interest taken in the visit. To many of the Sheffield boys, who were in London for the first time, the day was a red-letter one. Their keen powers of observation were not confined to the exhibitions only; one at least showed a truly surprising knowledge of the significance of the historical statues he saw on his way from and to the station. More human, perhaps, was the boy lost in admiration for the London 'bus drivers. It is no mean feat of endurance to visit two exhibitions in one day and carry off any sort of coherent idea of what has been seen. The novelty of the event must have given these boys added enthusiasm, for they describe with great clearness machinery and processes which interested them. The essays show the immense educational value of visits of this character, and they are, too, a real tribute to the work of the evening technical schools, where the boys study hard after a day's work.

Prof. Fernando Sanford discusses in the *Scientific Monthly* for October the *ignis fatuus,* one of those "meteoric appearances which have puzzled man since he began to inquire into the relations of phenomena, and which are still unexplainable." He reviews the various theories which have been formulated to explain these appearances. His final suggestion is that "they are little swarms of luminous bacteria which are carried up from the bottom of the marsh by rising bubbles of gas. Many kinds of luminous bacteria are known, and the marshes from which these lights arise are known to be the favoured habitat of some of these kinds. Some at least of these bacteria do not become luminous until exposed to the oxygen of the air. This seems to be true of the bacteria which cause the luminosity of rotten wood, the 'foxfire' of our boyhood."

In the *Scientific Monthly* for October Prof. J. H. Breasted, the eminent Egyptian scholar, publishes the first part of a lecture on the origin of civilisation, with special reference to the Nile Valley. Following the guidance of Blanckenhorn, he classifies the geology of the Nile Valley, in so far as it bears on the age of man there, into four chief periods:—(1) The Lacustrine Terraces, Pliocene and First Glacial; (2) the Upper River Terrace, Second Glacial; (3) the Lower River Terrace, Third Glacial; and (4) the Alluvium, Lower Fourth Glacial, Upper Post-Glacial. Far back in the European Glacial age the North African plateau was the home of early hunters, who have left signs of their presence not only in flint weapons, but also in a remarkable rock temple in the western desert. From this point he deals with burials and artefacts, including the marvellous ripple-flaked flint implements which are a mystery to craftsmen of the present day. Prof. Breasted leaves the later developments of the culture of prehistoric man in this region to a second article, which will complete a study of unusual interest.

Under the title of "The Linguistic Survey of India and the Census of 1911" Sir George Grierson has published a short summary of the great work which he has now brought to a successful termination. The Survey deals with a population amounting to 290,000,000, as compared with 312,000,000 recorded in the census of 1911, the difference being due to the fact that the census covered the whole of India, while large tracts, like Burma, were excluded from the operations of the Survey. In all, 872 different languages and dialects are recorded. The sub-family which contains the greatest number of languages, thirty-two in all, is the Tibeto-Burman, where the population is split up into numerous sections owing to their special environment in a mountainous region. On the other hand, there are only seventeen Indo-Aryan languages spoken by 226,000,000 in the wide northern plains, where facilities of intercommunication promoted fusion of races. If, as an example of similarly circumstanced Aryan groups, we take the Eranian languages spoken in and near India and the Dardic languages, we find that these two branches, like the Tibeto-Burman languages, are spoken in inhospitable mountain tracts, but that, unlike the Tibeto-Burman group, they have a power of persistence. If they do subdivide, the division is not into mutually unintelligible languages, but into mutually intelligible dialects, held together by a common grammatical basis. This summary of the work of a great scientific philologist may be warmly commended to the notice of all students of language.

IN the course of his presidential address to the North-East Coast Institution of Engineers and Shipbuilders on October 24, Mr. A. Ernest Doxford made strong references to the present economic position of the country, and said that much too little publicity has been given to this important matter. This has afforded the extremist his opportunity to inflame the minds of the uninformed, and lead the country perilously near to anarchy. Two great evils have to be fought—greed and ignorance—and both of these can be overcome by education. The first and most important point to consider in education is the qualification of the teacher. He must be sound in first principles, in his facts, and in his reasoning, and must be capable and willing to impart his knowledge to others. One would have thought that a common-sense nation, such as we certainly are, would have seen the absolute necessity of paying well for such qualities; but, instead, we find that the teaching profession is one of the worst paid, with the natural result that we get either inferior or discontented teachers. This discontent is bound to be reflected, to a greater or less extent, in the mind of the pupil, and is the source of a great deal of our social unrest. The brain-power of the teacher is often superior to that of many in other walks of life who are being better paid than he, and the injustice, in many cases, forces him into the band of extremists, where he thinks that a social upheaval may remedy his grievances. Mr. Doxford feels sure that if, in our reconstruction, we put education foremost, we shall remedy not only many of the evils that existed prior to the war, but also the more virulent types that have arisen since.

DR. MURRAY STUART describes, in the Records of the Geological Survey of India (vol. l., p. 28, 1919), the deposits of potash salts in the Punjab Salt Range and Kohat, and adds a paper on the probable origin and history of the rock-salt deposits in this region. The author believes that the salts were originally laid down from an evaporating saline solution, but that their present banded structure, of which a good illustration is given, is due to subsequent flow under pressure. The salt, in fact, is now not a sediment, but a schist. Included iron pyrites, liberating sulphuric acid, has led to the formation of gypsum as a product of contact with limestone, and is also responsible for the presence of mirabilite. The potash salts, whatever their original position in the series, now appear as patches and lenticles in the rearranged foliated mass, and no continuous bed can be expected. "The prospects of obtaining potash from the salt of the Salt Range are not promising."

ONE of the most definite tendencies in British agriculture is towards greater use of mechanical power, though the most satisfactory source of power remains to be ascertained. In the Journal of the Royal Society of Arts for September 26 and October 3 and 10, Dr. J. F. Crowley discusses the use of electricity in agriculture, with special reference to its development in Germany. Farm conditions make portability essential, and a limit is set to the power obtainable from steam or oil engines by their weight. These considerations led to the development of electrical power, which has been so notable a feature of German agriculture in recent years. By far the greater amount of power used on German farms is distributed from central stations by high-tension overhead lines. The transformers and motors may be either fixed or portable, and may be separated by considerable distances. Illustrated descriptions are given of the motors and their use in ordinary agricultural operations. Thinly populated rural districts in Germany secured the advantage of cheap electricity through the growth of numerous rural co-operative societies, which either produced electricity themselves or secured a cheap supply by guaranteeing a certain consumption. The author believes that considerable progress could be made if steps were taken to promote such co-operative movements in the rural districts of this country.

A SERIES of illustrated articles descriptive of the Hell Gate Bridge at New York has been appearing in recent issues of *Engineering*. The article in the issue for October 17 contains an interesting account of the span measurements. It was impossible to secure a satisfactory direct measurement, since no previous structure crossed the river at the site, and the distance between the skewbacks was determined by triangulation. To obtain a check a special steel tape about 1100 ft. long was made, and repeated measurements were taken, making calculated allowances for tension, deflection, and temperature. Difficulty was experienced in making the corrected measurements agree precisely on account of the unequal temperatures of different portions of the tape. There was, however, substantial agreement with the triangulation measurements. The day before the erection of the last panel of the arch-trusses was commenced, careful measurements showed a clearance of 1·75 in. between the extremities of the semi-trusses. A rise in temperature during the night produced a diminished clearance of 0·75 in. next morning. Work was therefore accelerated in order to have the lower chord inserted before the rising temperature eliminated the whole of the clearance. The first chord piece had to be lifted vertically into position rather than revolved from an oblique position in a vertical plane as is customary. The following day was rainy and cloudy, affording more favourable weather conditions.

AN interesting survey of the general position of chemical industries in the chief countries of the world, and especially in France, is contributed by M. René P. Duchemin to the *Revue Scientifique* for October 4. Due to war demands, there has been a considerable over-production of important "heavy" chemicals such as sulphuric acid, nitrogen compounds, chlorine, and bromine; and this not only by the belligerent nations, but by neutral countries also. Factories have been developed and extended, so that they now have much greater productive capacity than heretofore; and, moreover, large stocks were necessarily accumulated by the various Governments to provide for unforeseen contingencies during the progress of hostilities. In some branches of manufacture these stocks represent several years' normal output. Hence the position of the industry as regards the foregoing products is just now a difficult one. For France in particular, unless the industry is to dwindle and vanish, it will be necessary to devise measures for preventing destructive competition by indiscriminate admission of certain chemicals from other countries. The plan adopted by Great Britain, namely, limited importation, to prevent either undue lowering of prices by "dumping" or excessive charges by manufacturers here, is considered by the writer named to be the best for France to follow until something like normal conditions are again reached.

HARDNESS is an extremely important quality, but no satisfactory definition of it has yet been given. The geologist has his scale of hardness, and the engineer has his instruments for measuring the elusive quality. The tests employed by the engineer are good in their way, but they do not, as a rule, measure directly what the manufacturer wishes to obtain in the finished article. A manufacturer of cutlery, for example, is not directly interested in the way his steel gives when a steel ball is placed on it and pressed down with considerable force. But, in spite of the lack of direct applicability in the engineering tests, a good deal can be maintained in their favour, for there is doubtless some connection between the mechanical properties desired by the manufacturer and the readings of the sclerometer, as the instrument for measuring hardness is called. The interpretation of the readings may be difficult, and will probably require the acquisition of knowledge allied to that attained by the skilled craftsman; but, notwithstanding the difficulties, the regular use of a sclerometer can be productive of nothing but good. The Magnetic Sclerometer which has been put on the market by the Automatic and Electric Furnaces, Ltd., 281–283 Gray's Inn Road, London, W.C.1, may prove to be extremely useful in connection with a large and important class of material, viz. hard steels. As its action does not depend upon mechanical phenomena, its range is limited, and it cannot be used for non-magnetic substances. A rod of steel is placed in a yoke so as to form a complete magnetic circuit, and magnetised almost to saturation. The rod is then taken out of the yoke and the remanent magnetism, *i.e.* the magnetism which remains after the rod has been subjected to the demagnetising action of its own poles, is measured. To make the measurement the rod is placed in a coil connected to a ballistic galvanometer, and the kick of the galvanometer-needle is noted on the rapid removal of the rod from the coil. The throw of the needle, which indicates the amount of magnetic flux still remaining in the rod, may be taken as the reading of the sclerometer. In spite of its lack of direct applicability so far as hardness, in the ordinary sense of the word, is understood, the magnetic sclerometer should prove to be an extremely useful instrument in the hands of the trained researcher.

MESSRS. W. HEFFER AND SONS, LTD., Cambridge, have just issued a Catalogue (No. 182) of 1670 second-hand books dealing, among other subjects, with archæology, folk-lore, anthropology and kindred subjects, Egyptology, and philosophy; also with scientific serials. In the latter section we notice a set of the first 102 volumes of NATURE. The list includes the archæological and fine art library of the late Dr. Allen Sturge. A copy can be obtained free upon application.

OUR ASTRONOMICAL COLUMN.

COMETS.—Schaumasse's comet (1911 VII., 1919*d*) was detected on its return by M. Schaumasse at the Nice Observatory on October 29, being of magnitude 12. The observation indicates October 19 as the approximate date of perihelion. The following ephemeris is for Greenwich midnight (corrected approximately by the above observation):—

	R.A. h. m. s.	N. Decl. ° ′	Log *r*	Log Δ
Nov. 5 ...	12 27 23	6 28	0·0914	0·2610
9 ...	12 41 25	5 19	0·0951	0·2622
13 ...	12 55 13	4 11	0·0993	0·2634
17 ...	13 8 47	3 4	0·1038	0·2649
21 ...	13 22 5	1 58	0·1089	0·2666

As the distances from both sun and earth are increasing, the comet will remain faint.

Continuation of the ephemeris of comet 1919*c* for Greenwich midnight:—

	R.A. h. m. s.	S. Decl. ° ′		R.A. h. m. s.	S. Decl. ° ′
Nov. 7	17 0 44	10 30	Nov. 19	17 41 42	16 57
11	17 13 56	12 41	23	17 56 20	19 0
15	17 27 32	14 50	27	18 11 28	20 59

The comet is approaching perihelion and growing steadily brighter, but it is too near the sun for convenient observation.

THE SOURCES OF STELLAR ENERGY.—There have recently appeared two articles on this subject by Profs. Russell and Eddington. The first (Publications Ast. Soc. Pacific, August, 1919) points out the apparent inadequacy of the contraction hypothesis to explain the long duration of the output of energy (far in excess of Lord Kelvin's twenty million years) which is suggested by geology and by various other arguments. Hence it is concluded that there must be some unknown source of energy in the interior of giant stars, which dies down before the dwarf stage is reached. Making the supposition that the temperature is insufficient for the unknown source to come into action in the pre-M stage of giant stars, Prof. Russell shows that this stage would be short and extremely few stars would be in it at a time; he thus explains our failure to detect stars in this stage.

He also points out that the hypothesis would do away with the difficulty which Prof. Eddington expressed about the maintenance of the pulsations in Cepheid variables, viz. that the leakage of heat from the hotter to the colder regions would damp out the oscillations in a few thousand years. For the unknown source would supply heat to the interior at the greatest rate when it was hottest, thus making good the leakage.

Prof. Eddington (*Observatory*, October) makes a bold speculation as regards the unknown source of heat. He reminds us that a large proportion of the total energy of a star is locked up in its atoms, so that the energy would not be exhausted when the star cooled. It would need to be annihilated to liberate all the energy. He asks whether this annihilation of matter may not be going on in giant stars: "When a positive and negative charge collide centrally they go out of existence." He points out that at moderate temperatures the outer electrons of the atom form a protecting cushion; but in a very high temperature, ionisation is presumed to take place, robbing the nucleus of its protecting electrons and leaving it an exposed target. He makes an estimate that 1 atom out of 5×10^{18} must be annihilated each second. At this rate it would take about 2×10^{11} years to annihilate the whole star, so that the loss of mass in the periods usually assigned to the giant stage would be trifling.